

# Postgraduate Certificate

## Parallel Decomposition in Parallel and Distributed Computing



## Postgraduate Certificate Parallel Decomposition in Parallel and Distributed Computing

- » Modality: online
- » Duration: 6 weeks
- » Certificate: TECH Technological University
- » Dedication: 16h/week
- » Schedule: at your own pace
- » Exams: online

Website: [www.techtitute.com/us/information-technology/postgraduate-certificate/parallel-decomposition-parallel-distributed-computing](http://www.techtitute.com/us/information-technology/postgraduate-certificate/parallel-decomposition-parallel-distributed-computing)

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# 01

# Introduction

To fully exploit the hardware and software utilized in Parallel and Distributed Computing, the crucial aspect is the decomposition of diverse tasks or processes into smaller operations. Only a few years ago, accessing such capabilities was limited to costly infrastructures, but the advent of cloud computing has substantially augmented capacity while concurrently decreasing the need for substantial investments in computers and physical equipment. This development presents boundless opportunities for computer scientists, which is why this university program focuses on exploring the processes of parallel decomposition necessary to maximize the potential of this emerging paradigm.





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*By enrolling in this program, you will have the opportunity to cultivate expertise in parallel decomposition, with instruction provided by esteemed computer scientists and engineers”*

The availability of new programming tools and libraries has created a favorable entrepreneurial environment for computer scientists. Now, even smaller and specialized teams can undertake projects that were once complex and expensive.

Among the various domains, Parallel and Distributed Computing stands out prominently. Practically, the majority of programs and hardware are governed by this new computational model, which has become the prevailing standard. Computer scientists must be adequately prepared to utilize cutting-edge parallel decomposition tools, as this proficiency will significantly enhance their working conditions and propel their career trajectory forward.

This Diploma serves as an excellent starting point for delving deeper into parallel decomposition, covering a comprehensive agenda that encompasses common parallel hardware and software, graphics processing units, hybrid parallelization utilizing MPI and OpenMP, as well as computation with MapReduce.

Furthermore, this program is offered in a fully online format, enabling you to seamlessly balance your educational pursuits with other professional or personal commitments. Right from the first day of the degree program, the complete syllabus is downloadable, granting students the freedom to proceed with the course load at their own preferred pace.

This **Postgraduate certificate in Parallel Decomposition in Parallel and Distributed Computing** contains the most complete and up-to-date program on the market. The most important features include:

- ◆ The development of case studies presented by experts in Parallel and Distributed Computing
- ◆ The graphic, schematic, and practical contents with which they are created, provide practical information on the disciplines that are essential for professional practice
- ◆ Practical exercises where self-assessment can be used to improve learning
- ◆ Its special emphasis on innovative methodologies
- ◆ Theoretical lessons, questions for experts and individual reflection work
- ◆ Content that is accessible from any fixed or portable device with an internet connection



*Delve into different scenarios of Parallel Computing such as data mining or audio and image processing”*

“*Incorporating this certificate into your resume will provide a substantial boost to your career*”

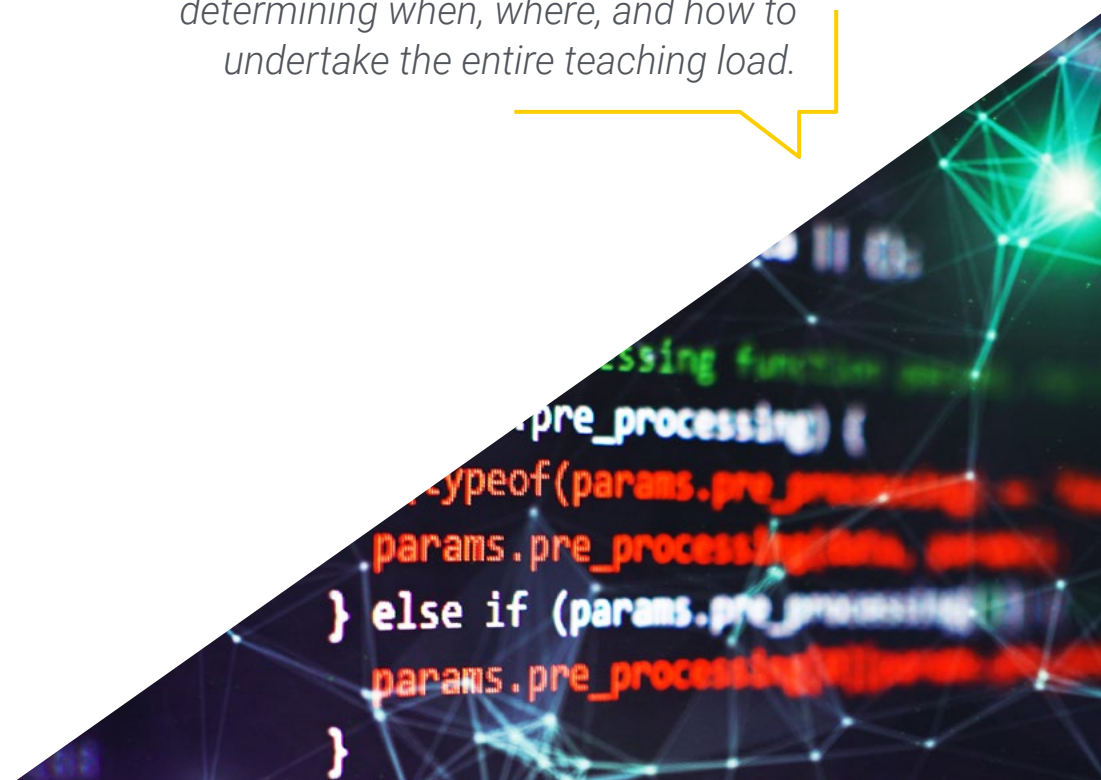
The teaching staff of the program consists of professionals from the industry who bring their valuable work experience to the table. Additionally, renowned specialists from leading societies and prestigious universities contribute their expertise to enrich the program.

The program's multimedia content, created using state-of-the-art educational technology, enables professionals to learn in a contextual and situated learning environment. This simulated environment offers immersive education specifically designed to prepare individuals for real-world situations.

The program's design emphasizes Problem-Based Learning, requiring professionals to actively solve various real-world practice situations that are presented to them throughout the academic year. For this purpose, the student will be assisted by an innovative interactive video system created by renowned and experienced experts.

*You will have the opportunity to learn about the foremost parallel decomposition systems from esteemed computer science professionals.*

*At TECH, you have the autonomy to make crucial decisions, such as determining when, where, and how to undertake the entire teaching load.*



# 02 Objectives

The primary objective of this degree program, considering the intricacies of Parallel and Distributed Computing, is to furnish computer scientists with the essential resources and tools required for specialization in parallel decomposition processes. Through this diploma, computer scientists will acquire the foundational knowledge needed to analyze shared memory parallelism proposals and evaluate MapReduce computation proposals, among other critical skills in this field.





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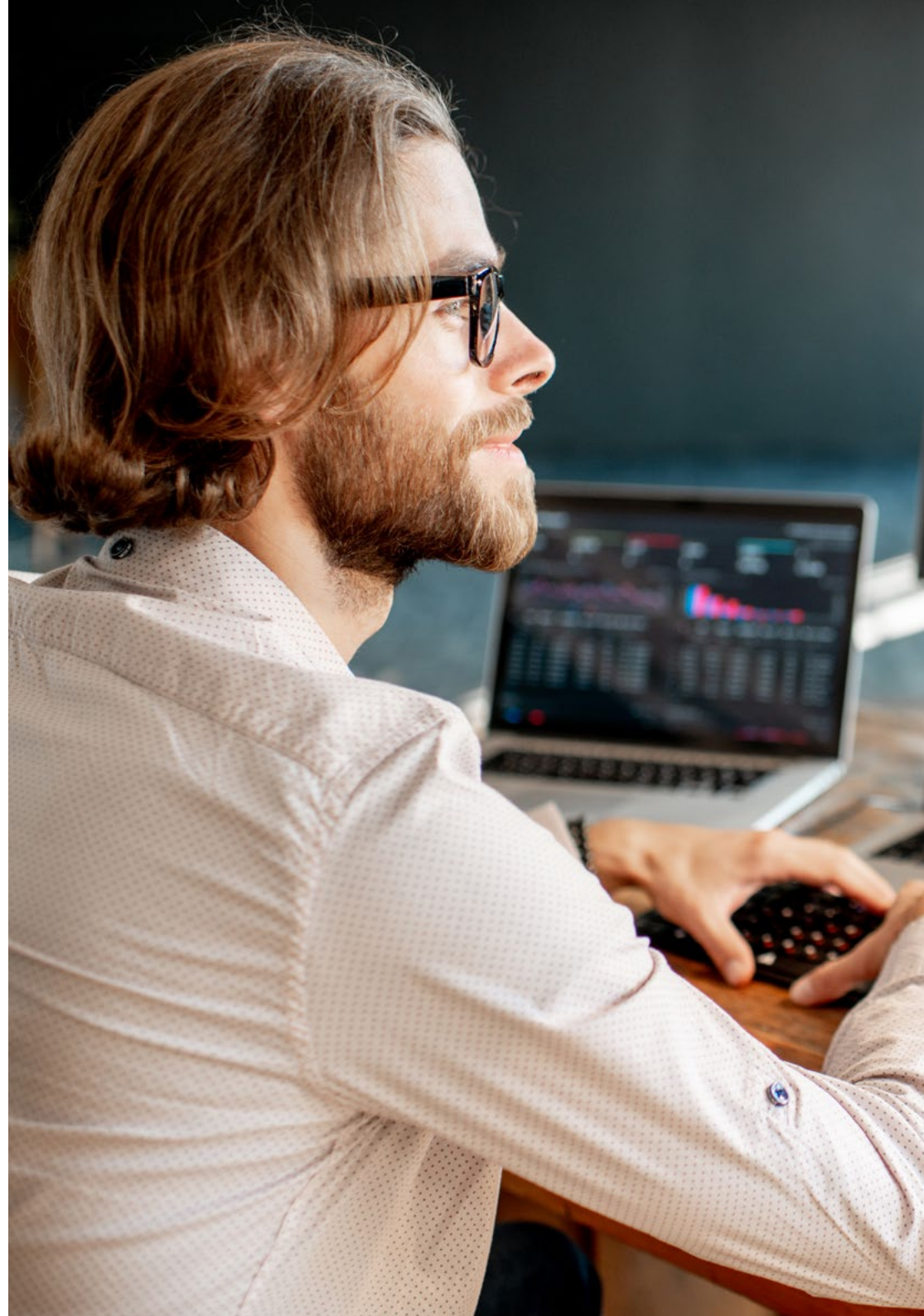
*Enroll today and seize the opportunity to gain a substantial career advantage, propelling you towards the professional position you truly deserve”*



## General Objectives

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- ◆ Analyze the different components of Parallel and Distributed Computing
- ◆ Measure and compare their efficiency to analyze the performance of the set of components used
- ◆ Analyze in depth Multiplatform Parallel Computing to use task-level parallelism between different hardware accelerators
- ◆ Analyze in detail current software and architectures
- ◆ Develop in depth the relevant aspects of Parallel and Distributed Computing
- ◆ Specialize the students in the application of Parallel and Distributed Computing across various industry sectors





## Specific Objectives

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- ◆ Analyze the importance of the decomposition of parallel processes in solving computational problems
- ◆ Explore diverse examples that demonstrate the practical application and use of computing and its parallel decomposition
- ◆ Highlight procedures and tools that enable the execution of parallel processes, aiming to achieve optimal performance
- ◆ Develop specialized knowledge to identify parallel process decomposition scenarios and choose and apply the appropriate tool

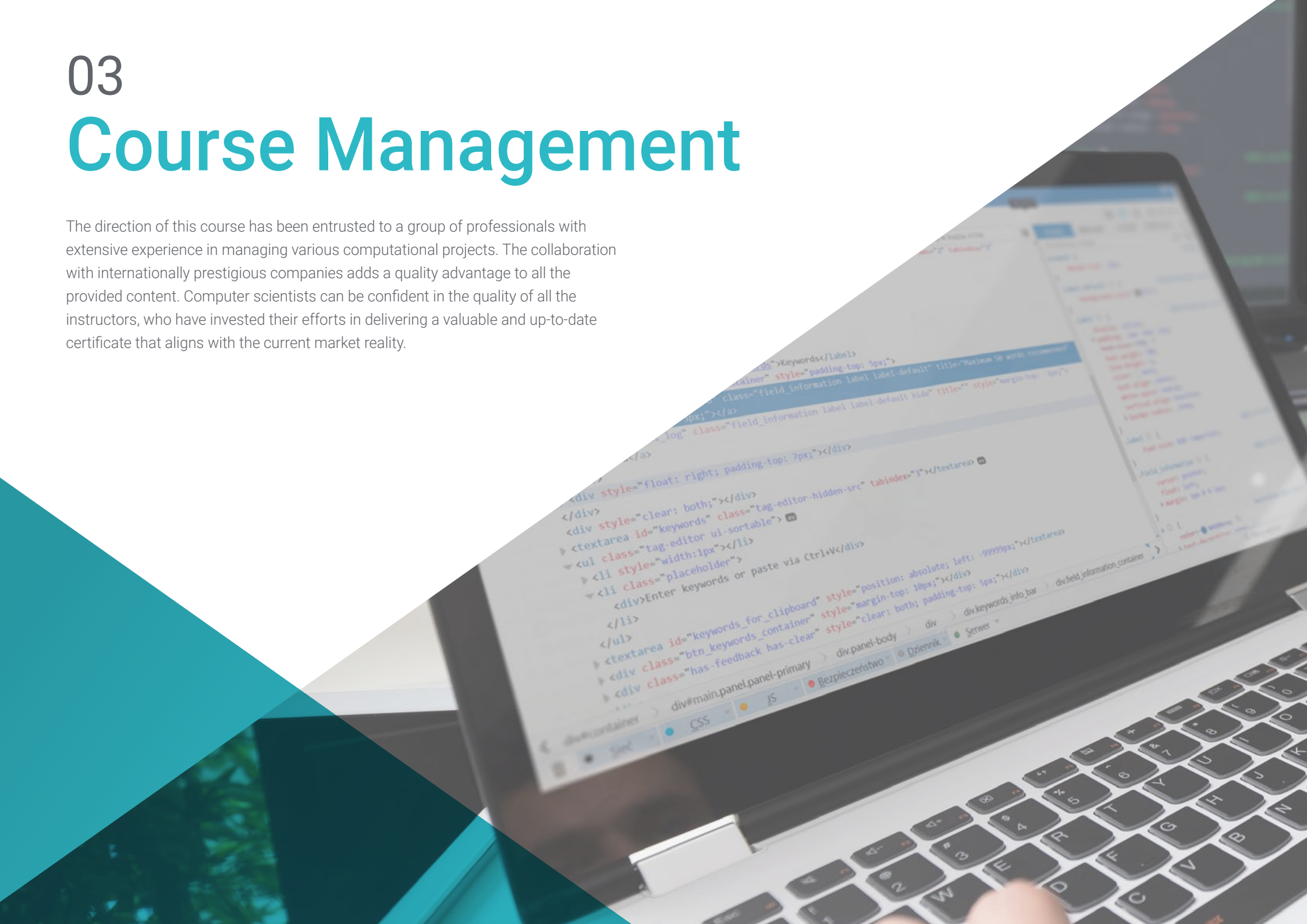
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*Your objectives and TECH's are aligned. You will have the full support of the world's largest online academic institution"*

# 03

# Course Management

The direction of this course has been entrusted to a group of professionals with extensive experience in managing various computational projects. The collaboration with internationally prestigious companies adds a quality advantage to all the provided content. Computer scientists can be confident in the quality of all the instructors, who have invested their efforts in delivering a valuable and up-to-date certificate that aligns with the current market reality.





“

*You will have the opportunity to directly consult with the teaching team and receive personalized tutoring, allowing you to address any doubts or questions you may have”*

## Management



### Mr. Olalla Bonal, Martín

- Senior Blockchain Practice Manager at EY
- Blockchain Client Technical Specialist for IBM
- Director of Architecture for Blocknitive
- Non-Relational Distributed Databases Team Coordinator for wedoIT (IBM Subsidiary)
- Infrastructure Architect at Bankia
- Head of Layout Department at T-Systems
- Department Coordinator for Bing Data Spain S.L.



## Professors

### Dr. Almendras Aruzamen, Luis Fernando

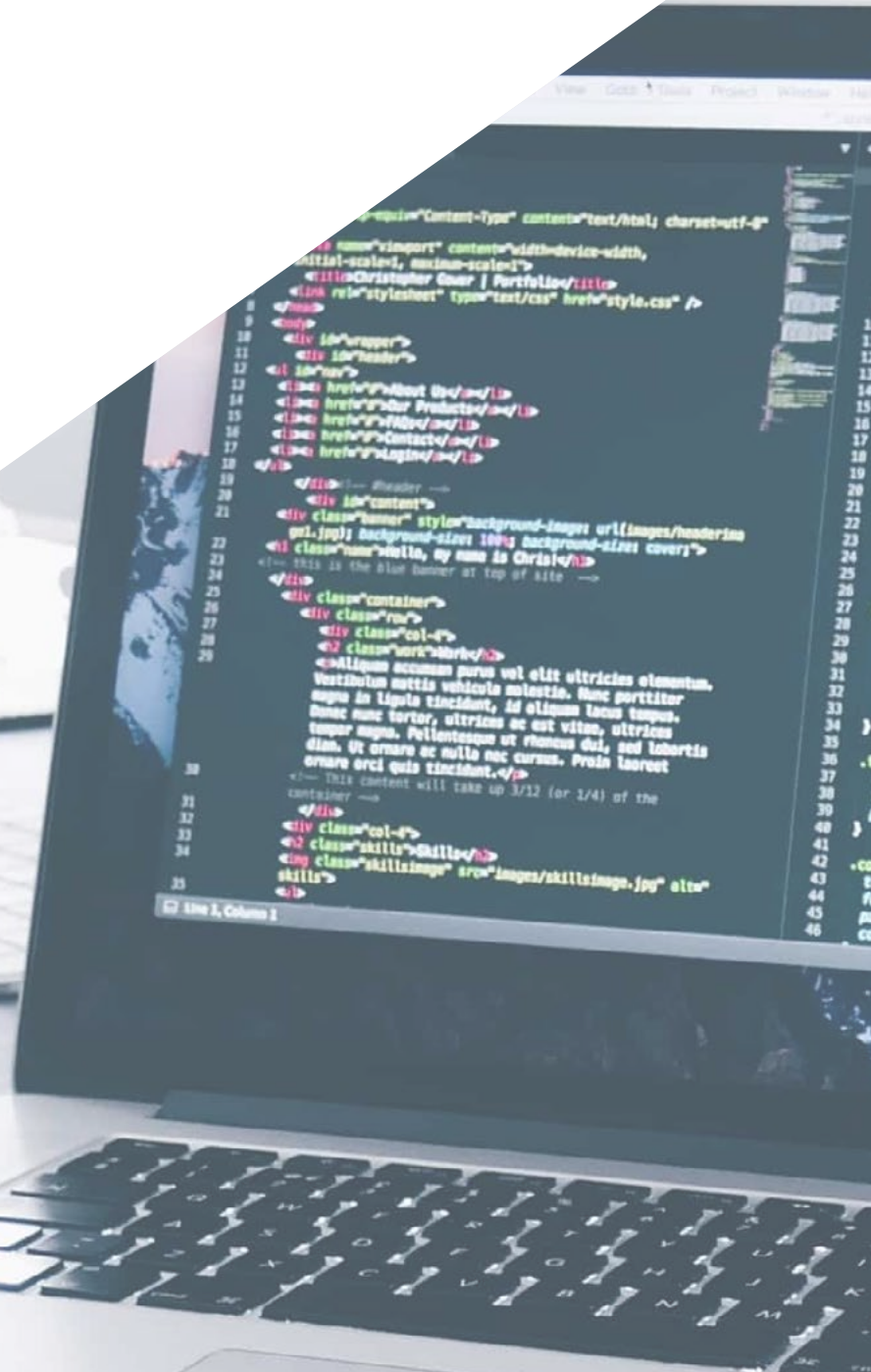
- ◆ Data Engineer and Business Intelligence. Solutio Group, Madrid
- ◆ Data engineer at Indizen
- ◆ Data and *business intelligence* engineer at technology and people
- ◆ Database, *big data* and *business intelligence* support engineer at Equinix
- ◆ Data Engineer. Jalasoft
- ◆ Product Manager and responsible for the business analytics area at Goja
- ◆ Business Intelligence Sub-Manager. Pc's VIVA Nuevatel
- ◆ Responsible for the datrawarehouse and big data area at Viva
- ◆ Software Development Leader at Intersoft
- ◆ Degree in Computer Science from the Mayor University of San Simon
- ◆ PhD PhD in Computer Engineering. Universidad Complutense de Madrid
- ◆ Master's Degree in Computer Engineering from the Complutense University of Madrid
- ◆ Master's Degree in Information Systems and Technology Management from the Mayor University of San Simon
- ◆ International instructor. Oracle Database Proydesa - Oracle, Argentina
- ◆ Project Management Professional Certification Scoping Consultancy, Chile

# 04

# Structure and Content

*Relearning*, a pedagogical methodology in which TECH is a pioneer, helps computer scientists save crucial time in the study process. By reiterating the most important concepts throughout the course, students naturally and progressively acquire all the expected knowledge. The availability of a substantial amount of complementary material further strengthens the position of this certificate as a preferred academic option for those seeking to delve deeper into parallel decomposition.

```
    <!-- Content-Type: content=text/html; charset=utf-8 -->
    <!-- Import content width=device-width,
    initial-scale=1, maximum-scale=1 -->
    <!-- Christopher Garb | Portfolio -->
    <link rel="stylesheet" type="text/css" href="style.css" />
  </head>
  <body>
    <div id="wrapper">
      <div id="header">
        <div id="nav">
          <a href="#">Home /</a>
          <a href="#">About /</a>
          <a href="#">Products /</a>
          <a href="#">Blog /</a>
          <a href="#">Contact /</a>
          <a href="#">Login /</a>
        </div>
        <div id="header-content">
          <div class="banner" style="background-image: url(images/bannerimg01.jpg); background-size: 100%; background-size: cover;">
            <div class="name">Hello, my name is Chris!</div>
            <!-- This is the blue banner at top of site -->
          </div>
          <div class="container">
            <div class="row">
              <div class="col-4">
                <div class="work-item">
                  <h3>Allquam accumsan cursus vel elit ultricies elementum.
                  Vestibulum mattis vehicula molestie. Nunc porttitor
                  magna in ligula tincidunt, id aliquam lacus tempus.
                  Donec nunc tortor, ultricies ac est vitae, ultricies
                  tempus magna. Pellentesque ut rhoncus dui, sed lobortis
                  diam. Ut ornare ac nulla nec cursus. Proin laoreet
                  ornare orci quis tincidunt.</h3>
                  <!-- This content will take up 3/12 (or 1/4) of the
                  container -->
                </div>
              </div>
              <div class="col-4">
                <div class="skills">Skills</div>
                
              </div>
            </div>
          </div>
        </div>
      </div>
    </body>
  </html>
```





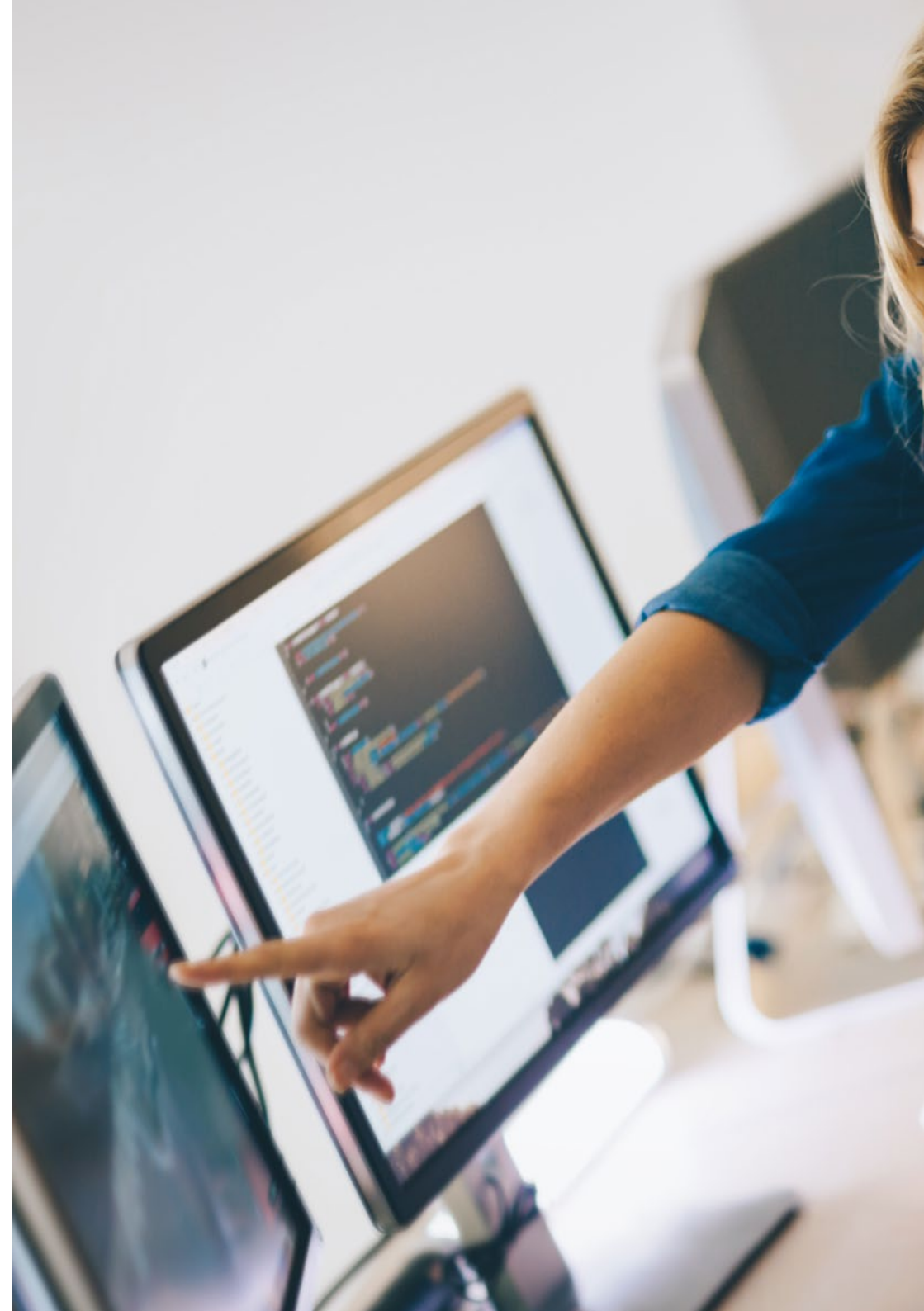
```
style.css
1 /*
2  * CSSReset.com - How To Keep Footer At Bottom of Page with CSS
3  *
4  * Original Tutorial: http://www.cssreset.com/2010/css-tutorials/how
5  * License: Free - do whatever you like with it! Credit and linkbacks
6  *
7  * NB: Make sure the value for 'padding-bottom' on #content is equal
8  */
9 html,
10 body {
11     margin:0;
12     padding:0;
13     height:100%;
14 }
15
16 #wrapper {
17     min-height:100%;
18     position:relative;
19 }
20 #header {
21     background:#f0f0f0;
22     padding:0px 0px 0px;
23 }
24 #content {
25     padding-bottom:300px; /* Height of the footer element */
26 }
27 #footer {
28     background:#1A1D20;
29     height:300px;
30     position:absolute;
31     bottom:0;
32     left:0;
33     width:100%;
34 }
35
36 footercopyright {
37     text-align:left;
38     font-size:15px;
39     padding:30px 0px 0px;
40 }
41
42 contactfooter {
43     text-align:left;
44     font-size:20px;
45     padding:5px;
46     color:#002060;
47 }
```

“

*You will have access to detailed videos, summaries, and audiovisual content created by the professors themselves”*

## Module 1. Parallel Decomposition in Parallel and Distributed Computing

- 1.1. Parallel Decomposition
  - 1.1.1. Parallel Processing
  - 1.1.2. Architecture
  - 1.1.3. Supercomputers
- 1.2. Parallel Hardware and Parallel Software
  - 1.2.1. Serial Systems
  - 1.2.2. Parallel Hardware
  - 1.2.3. Parallel Software
  - 1.2.4. Input and Output
  - 1.2.5. Performance
- 1.3. Parallel Scalability and Recurring Performance Issues
  - 1.3.1. Parallelism
  - 1.3.2. Parallel Scalability
  - 1.3.3. Recurring Performance Issues
- 1.4. Shared Memory Parallelism
  - 1.4.1. Shared Memory Parallelism
  - 1.4.2. OpenMP and Pthreads
  - 1.4.3. Shared Memory Parallelism Examples
- 1.5. Graphics Processing Unit (GPU)
  - 1.5.1. Graphics Processing Unit (GPU)
  - 1.5.2. Computational Unified Device Architecture (CUDA)
  - 1.5.3. Unified Computational Device Architecture (CUDA). Examples
- 1.6. Message Passing Systems
  - 1.6.1. Message Passing Systems
  - 1.6.2. MPI. Message Passing Interface
  - 1.6.3. Message Passing Systems. Examples



- 1.7. Hybrid Parallelization with MPI and OpenMP
  - 1.7.1. Hybrid Programming
  - 1.7.2. MPI/OpenMP Programming Models
  - 1.7.3. Hybrid Decomposition and Mapping
- 1.8. MapReduce Computing
  - 1.8.1. Hadoop
  - 1.8.2. Other Computing Systems
  - 1.8.3. Parallel Computing Examples
- 1.9. Model of Actors and Reactive Processes
  - 1.9.1. Stakeholder Model
  - 1.9.2. Reactive Processes
  - 1.9.3. Actors and Reactive Processes. Examples
- 1.10. Parallel Computing Scenarios
  - 1.10.1. Audio and image processing
  - 1.10.2. Statistics/Data Mining
  - 1.10.3. Parallel Sorting
  - 1.10.4. Parallel Matrix Operations



*Real-life case studies will enhance your understanding of all the advanced topics covered in the Diploma, providing practical insights into their application”*



# 05 Methodology

This academic program offers students a different way of learning. Our methodology uses a cyclical learning approach: **Relearning**.

This teaching system is used, for example, in the most prestigious medical schools in the world, and major publications such as the **New England Journal of Medicine** have considered it to be one of the most effective.





*Discover Relearning, a system that abandons conventional linear learning, to take you through cyclical teaching systems: a way of learning that has proven to be extremely effective, especially in subjects that require memorization"*

## Case Study to contextualize all content

Our program offers a revolutionary approach to developing skills and knowledge. Our goal is to strengthen skills in a changing, competitive, and highly demanding environment.

“

*At TECH, you will experience a learning methodology that is shaking the foundations of traditional universities around the world”*



*You will have access to a learning system based on repetition, with natural and progressive teaching throughout the entire syllabus.*



*The student will learn to solve complex situations in real business environments through collaborative activities and real cases.*

### A learning method that is different and innovative

This TECH program is an intensive educational program, created from scratch, which presents the most demanding challenges and decisions in this field, both nationally and internationally. This methodology promotes personal and professional growth, representing a significant step towards success. The case method, a technique that lays the foundation for this content, ensures that the most current economic, social and professional reality is taken into account.

“*Our program prepares you to face new challenges in uncertain environments and achieve success in your career”*

The case method has been the most widely used learning system among the world's leading Information Technology schools for as long as they have existed. The case method was developed in 1912 so that law students would not only learn the law based on theoretical content. It consisted of presenting students with real-life, complex situations for them to make informed decisions and value judgments on how to resolve them. In 1924, Harvard adopted it as a standard teaching method.

What should a professional do in a given situation? This is the question that you are presented with in the case method, an action-oriented learning method. Throughout the course, students will be presented with multiple real cases. They will have to combine all their knowledge and research, and argue and defend their ideas and decisions.

## Relearning Methodology

TECH effectively combines the Case Study methodology with a 100% online learning system based on repetition, which combines different teaching elements in each lesson.

We enhance the Case Study with the best 100% online teaching method: Relearning.

*In 2019, we obtained the best learning results of all online universities in the world.*

At TECH you will learn using a cutting-edge methodology designed to train the executives of the future. This method, at the forefront of international teaching, is called Relearning.

Our university is the only one in the world authorized to employ this successful method. In 2019, we managed to improve our students' overall satisfaction levels (teaching quality, quality of materials, course structure, objectives...) based on the best online university indicators.





In our program, learning is not a linear process, but rather a spiral (learn, unlearn, forget, and re-learn). Therefore, we combine each of these elements concentrically.

This methodology has trained more than 650,000 university graduates with unprecedented success in fields as diverse as biochemistry, genetics, surgery, international law, management skills, sports science, philosophy, law, engineering, journalism, history, and financial markets and instruments. All this in a highly demanding environment, where the students have a strong socio-economic profile and an average age of 43.5 years.

*Relearning will allow you to learn with less effort and better performance, involving you more in your training, developing a critical mindset, defending arguments, and contrasting opinions: a direct equation for success.*

From the latest scientific evidence in the field of neuroscience, not only do we know how to organize information, ideas, images and memories, but we know that the place and context where we have learned something is fundamental for us to be able to remember it and store it in the hippocampus, to retain it in our long-term memory.

In this way, and in what is called neurocognitive context-dependent e-learning, the different elements in our program are connected to the context where the individual carries out their professional activity.



This program offers the best educational material, prepared with professionals in mind:



### Study Material

All teaching material is produced by the specialists who teach the course, specifically for the course, so that the teaching content is highly specific and precise.

These contents are then applied to the audiovisual format, to create the TECH online working method. All this, with the latest techniques that offer high quality pieces in each and every one of the materials that are made available to the student.



### Classes

There is scientific evidence suggesting that observing third-party experts can be useful.

Learning from an Expert strengthens knowledge and memory, and generates confidence in future difficult decisions.



### Practising Skills and Abilities

They will carry out activities to develop specific skills and abilities in each subject area. Exercises and activities to acquire and develop the skills and abilities that a specialist needs to develop in the context of the globalization that we are experiencing.



### Additional Reading

Recent articles, consensus documents and international guidelines, among others. In TECH's virtual library, students will have access to everything they need to complete their course.





#### Case Studies

Students will complete a selection of the best case studies chosen specifically for this program. Cases that are presented, analyzed, and supervised by the best specialists in the world.



#### Interactive Summaries

The TECH team presents the contents attractively and dynamically in multimedia lessons that include audio, videos, images, diagrams, and concept maps in order to reinforce knowledge.

This exclusive educational system for presenting multimedia content was awarded by Microsoft as a "European Success Story".



#### Testing & Retesting

We periodically evaluate and re-evaluate students' knowledge throughout the program, through assessment and self-assessment activities and exercises, so that they can see how they are achieving their goals.



# 06 Certificate

The Postgraduate Certificate in Parallel Decomposition in Parallel and Distributed Computing guarantees students, in addition to the most rigorous and up-to-date education, access to a Postgraduate Certificate issued by TECH Technological University.



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*By successfully completing this program, you can obtain your certificate and without the need for travel or dealing with cumbersome paperwork”*

This **Postgraduate certificate in Parallel Decomposition in Parallel and Distributed Computing** contains the most complete and up-to-date program on the market.

After the student has passed the assessments, they will receive their corresponding **Postgraduate Certificate** issued by **TECH Technological University** via tracked delivery\*.

The diploma issued by **TECH Technological University** will reflect the qualification obtained in the Postgraduate Certificate, and meets the requirements commonly demanded by labor exchanges, competitive examinations, and professional career evaluation committees.

Title: **Postgraduate Certificate in Parallel Decomposition in Parallel and Distributed Computing**

Official N° of Hours: **150 h.**



\*Apostille Convention. In the event that the student wishes to have their paper diploma issued with an apostille, TECH EDUCATION will make the necessary arrangements to obtain it, at an additional cost.

future

health confidence people

education information tutors

guarantee accreditation teaching

institutions technology learning

community commitment

**tech** technological  
university

personalized service innovation

knowledge preservation  
online training

development languages

virtual classroom

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